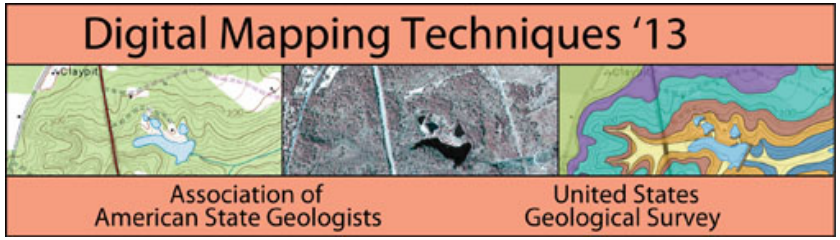


The following was presented at DMT'13
(June 2-5, 2013, Golden, CO).

The contents are provisional and will be
superseded by a paper in the
DMT'13 Proceedings.

See also earlier Proceedings (1997-2012)
http://ngmdb.usgs.gov/info/dmt/

NOTE: This image is optimized for onscreen viewing and is not an authoritative representation of the data.

Generalized Geologic Map of Bear Creek Valley, Jackson County, Oregon

2011

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
VICKI S. McCONNELL, STATE GEOLOGIST

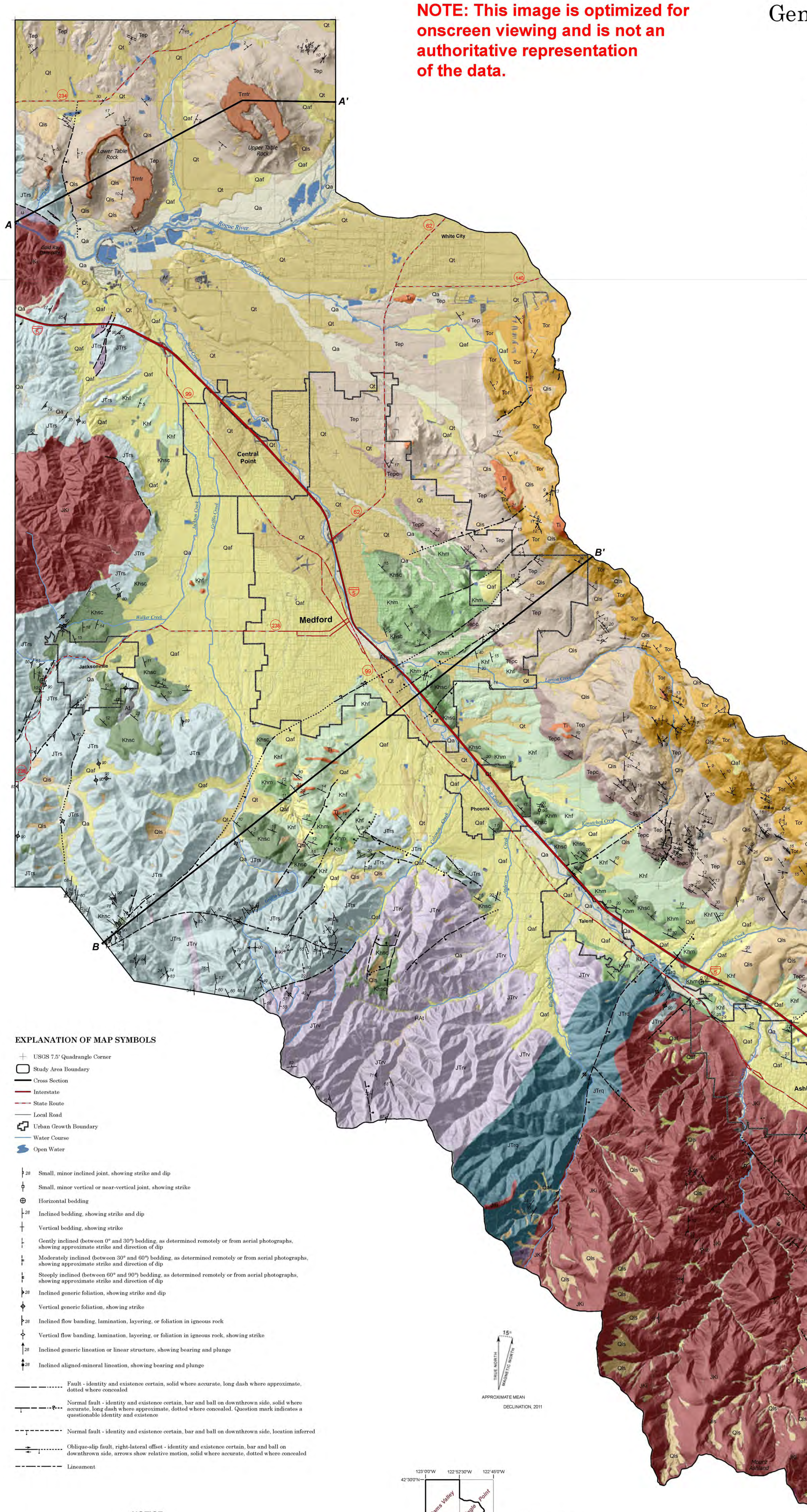
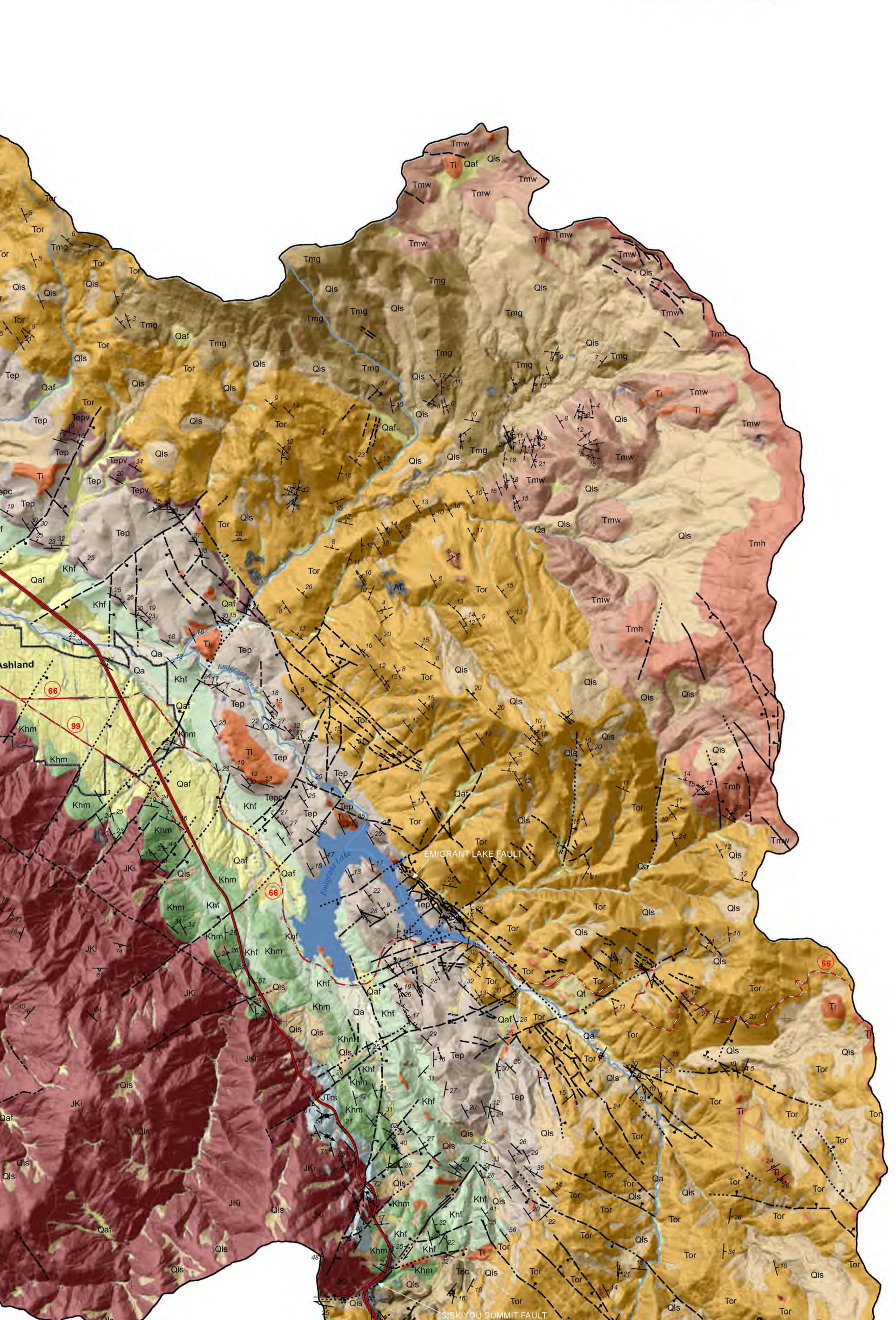
OPEN-FILE REPORT O-11-11

Geologic Database and Generalized Geologic Map of Bear Creek Valley, Jackson County, Oregon

By Thomas J. Wiley, Jason D. McClaughry, and Jad A. D'Allura

Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G10AC00324. Mapping by D'Allura was also supported by the Carpenter Foundation and by the Southern Oregon University President's Mini-Grant and Professional Development funds.

PLATE 1

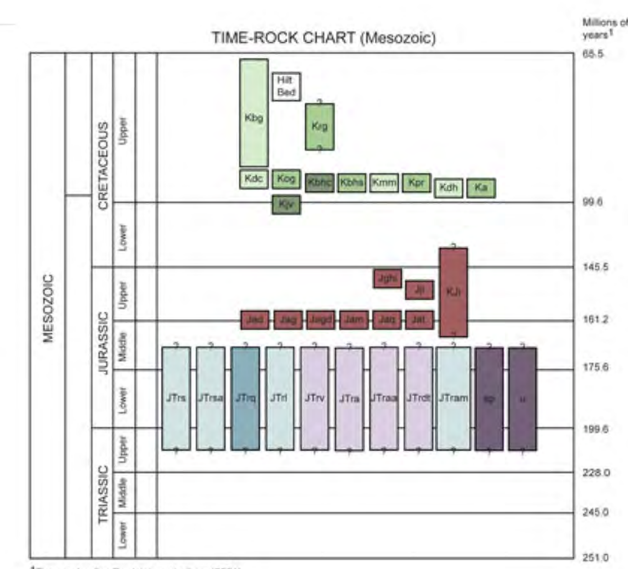



INTRODUCTION

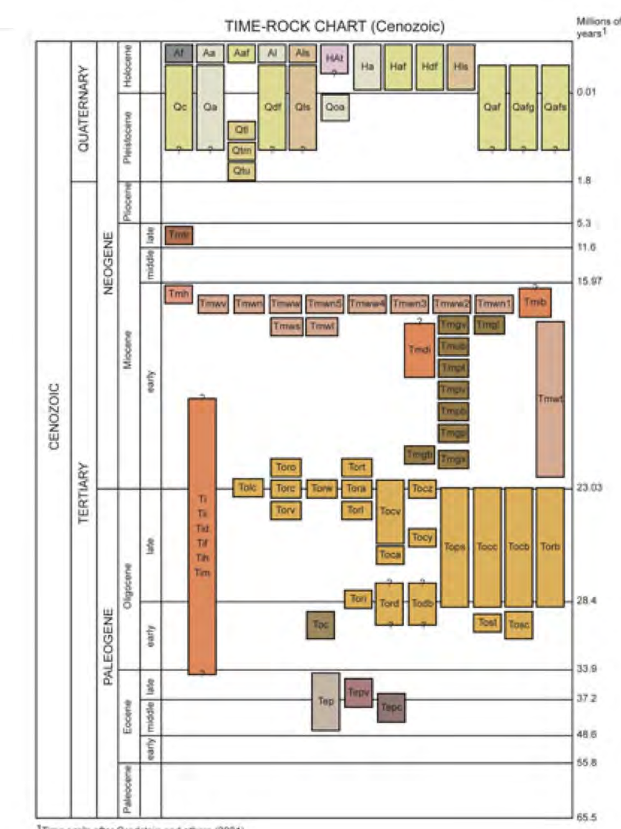
Bear Creek Valley in southwestern Oregon is an alluvial basin flanked by the Klamath-Siskiyou and Western Cascade Range physiographic provinces. It encompasses the Medford-Ashland urban area, Oregon's fourth largest, and includes agricultural, industrial, rural residential, and forest lands.

This thematic geologic map is derived from detailed, 1:8,000-scale digital geologic data contained in an accompanying geodatabase. The geodatabase adheres to the Oregon Geologic Data Compilation (OGDC) format (Ma and others, 2009). The Bear Creek Valley geodatabase was created by 1) compiling new and existing geologic maps and data, 2) using high-resolution lidar-derived digital elevation models (DEMs) to help locate surficial deposits and contacts, and 3) limited field work. The 107 geologic units in the geodatabase are grouped into 24 generalized map units that share common geologic origins and characteristics that include their suitability for aggregate, potential for groundwater production, or potential for geologic hazards. Generalized map unit symbols, descriptions for each generalized unit, and a list of the geodatabase units that comprise each generalized unit are given here. The time-rock charts show the 107 geodatabase units color coded to match the 24 generalized map units. Complete descriptions of the geodatabase units are provided in the accompanying digital report. This lidar-based update of the geologic map is one example of how the Bear Creek Valley geodatabase can be used to generate thematic maps and thus refine our understanding of the geologic conditions in the Bear Creek Valley that control groundwater, hydrocarbon and aggregate resources, and landslide and seismic hazards.

Location Map



[1]Time scale after Gradstein and others (2004).



[1]Time scale after Gradstein and others (2004).

EXPLANATION OF MAP UNITS

QUATERNARY SURFICIAL DEPOSITS

Af — **Artificial Fill (Anthropocene)**
Man-made deposits of gravel, sand, silt, clay, and construction material; includes dams, road embankments, causeways, large culvert fills, and, locally, mined land. *(Geodatabase unit Af)*

HAt — **Tufa (Holocene and Anthropocene)**
Porous, limestonelike deposits that formed along the Anderson Creek drainage in areas downstream from carbonate-saturated springs. The distinctive stepped, flat-bottomed valley is underlain by tufa produced when water cooled evaporated or otherwise precipitated (e.g., by microbes) calcium carbonate, thus building up the valley floor. *(Geodatabase unit HAt)*

Qa — **Alluvium (Quarternary)**
Unconsolidated gravel, sand, silt, and clay deposited in active stream channels, in the bed of the former Gold Ray Reservoir, and on adjoining flood plains of the Rogue River, Bear Creek, and their tributaries. Near the confluence of Bear Creek and the Rogue River, the unit is up to 15 m (50 ft) thick and fills channels and floodplains of sand, silt, and gravel up to 1.6 km (1.0 mi) wide. Unit Qa ranges in age from late Pleistocene to Anthropocene. These active floodplains are set into older Pleistocene terrace deposits. Areas underlain by unit Qa may be subject to significant flooding and channel migration hazards. Most of the area shown as Qa was inundated by the 1861 flood (Beaulieu and Hughes, 1977). The unit can be a productive unconfined aquifer but may be susceptible to contamination. The unit is an important source of sand and gravel used for aggregate. *(Geodatabase Units Aa, Al, Ha, Qa, Qoa)*

Qls — **Landslide deposits (Quaternary)**
Irregular bodies of chaotically mixed rock, soil, and colluvium deposited by landslides. Mapped deposits range in size from 45 m^2 (500 ft^2) to over 10 km^2 (3.6 mi^2). Landslides are more common in mixed lithologies of volcanic formations that crop out along the eastern side of the valley. Triggering mechanisms for landslides include intense rainfall, earthquakes, devegetation, excavation, loading, and loss of root strength following fires. Many larger landslides have probably been intermittently active over hundreds or thousands of years, and all areas of existing landslide deposits should be considered at risk for further slope movement. *(Geodatabase units Als, Hls, Qls)*

Qaf — **Alluvial fans, debris fans and colluvium (Quaternary)**
Gravel, sand, silt, clay, and woody debris mantling shallow to moderately steep slopes or deposited where steep upland drainages reach the valley floor. Rapidly moving debris flows, which pose hazards to life and property, may occur during episodes of intense rainfall, and the deposits from these events will be concentrated on alluvial fans that lie at the mouths of steep-sided, colluvium-filled canyons and upland drainages. May be a productive aquifer but is susceptible to contamination. *(Geodatabase units Aaf, Haf, Hdf, Qc, Qaf, Qafg, Qafs, Qdf)*

Qt — **Terrace deposits (Pleistocene)**
Gravel and sand deposits that underlie much of the flat valley floor and are incised by younger streams. Includes the broad plain between the Rogue River and Medford in the north that merges with (or is covered by) coalescing alluvial fans where Griffin, Coleman, Jackson, and Anderson Creeks leave steeper terrane and emerge on the valley floor to the south. The oldest, highest surface recognized is topped with distinctive subrounded mounds 0.5 to 1.5 m (1.6 to 4.9 ft) high and 8 to 40 m (26 to 131 ft) across. May be a productive aquifer but is susceptible to contamination. *(Geodatabase units Qtl, Qtm, Qtu)*

Disconformity

CENOZOIC VOLCANIC AND SEDIMENTARY ROCKS

Volcanic Rocks of the Early High Cascades

Tmtr — **Table Rocks Andesite (late Miocene, 7.2 Ma)**
Andesite lava flow that forms the "U"-shaped mesas of Upper Table Rock and Lower Table Rock (Wiley and Smith, 1993; Hladky, 1998). Although the lava originally flowed down the valley of the ancestral Rogue River from its source near Olson Mountain, the lava now forms elevated resistant caps that protect the lower parts of the mesas from erosion; an excellent example of "inverted topography." The 210 m (700 ft) elevation difference between the base of the Table Rocks lava flow and the bedrock channel beneath alluvium at the valley floor suggests that the Rogue River cuts downward at a rate of approximately 30 m (100 ft) per million years. Rock from this lava flow was used to construct the William L. Jess Dam at Lost Creek Lake. The mesa surfaces are locally covered with roughly circular mounds 3 to 30 m (10 to 100 ft) in diameter and 30-60 cm (1-2 ft) high. *(Geodatabase unit Tmtr)*

Angular Unconformity

Volcanic and Sedimentary Rocks of the Early Western Cascades

Tmh — **Heppsie Formation (early Miocene)**
Basaltic andesite, basalt, and andesite lava flows that originated east of the study area and flowed westward, in some cases down paleocanyons (Hladky, 1995). Radiometric ages for the unit range from 21.9 to 22.7 Ma. Basalt flows typically have columnar joints; andesite flows are platy. Locally used as a crushed aggregate resource. *(Geodatabase unit Tmh)*

Little Butte Volcanics

Tmw — **Wasson Formation (lower Miocene)**
Interlayered tuff, basaltic to dacitic lava flows, related vent deposits, and lake-bed sediment. The Wasson Formation includes the 21.4 Ma tuff of Eagle Butte, a thick, nonwelded to welded, dacitic ash-flow tuff. Lacustrine shales are thinly laminated and locally contain fossil leaves. Some of the largest landslides in the area occur where Wasson Formation tuffs are overlain by Heppsie Formation lava flows. *(Geodatabase units Tmwt, Tmwv, Tmwn, Tmww, Tmws, Tmwl, Tmwn1, Tmww2, Tmwn3, Tmww4, Tmwn5)*

Tmg — **Grizzly Peak Volcanics (lower Miocene)**
Basaltic andesite lava flows, volcanic mudflow breccia, vent deposits, and tuff erupted from a large early Miocene stratovolcano near Grizzly Peak (Hladky, 1996). Consists of an upper unit of lava flows, mudflow breccias, and vent deposits; a middle unit of tuff with a few flows; and a lower unit of flows and vent deposits. *(Geodatabase units Tmgb, Tmub, Tmgx, Tmgl, Tmgv, Tmgp, Tmpt, Tmpb, Tmpv)*

Tor — **Roxy Formation (Oligocene and lower Miocene)**
Basaltic andesite and andesite lava flows, tuff and volcaniclastic rocks, and vent complexes that form the eastern margin of Bear Creek Valley. Radiometrically dated lava flows range in age from 30.8 Ma to 24.6 Ma (Fiebelkorn and others, 1983). The Roxy Formation is divided into the Iron Gate, Dry Creek, Soda Springs, Camp Creek, and Rio Canyon Members. Thick paleosols in the lower part of the Formation suggest the presence of internal disconformities spanning significant periods of time. The lava flows of this unit are a source for crushed rock aggregate. The interbedded flows and volcaniclastic rocks are highly susceptible to landslides. *(Geodatabase units Torb, Torl, Torv, Tolc, Toro, Torc, Tort, Tora, Tocb, Tocc, Tocy, Tocz, Toca, Tocv, Tosc, Tost, Tord, Todb, Tori, Torw, Tops)*

Toc — **Colestin Formation (lower Oligocene)**
Nonmarine andesitic to dacitic or rhyolitic volcaniclastic, pyroclastic, and flow rocks with minor basaltic material (Carlton, 1972; Bestland, 1987). These are the oldest of the Early Western Cascade Range volcanic units exposed in Bear Creek Valley. Preserved only in the southern part of the study area. *(Geodatabase unit Toc)*

Unconformity (angular?)

PALEOGENE TERRESTRIAL SEDIMENTARY ROCKS

Payne Cliffs Formation (middle and upper Eocene)
Terrestrial sedimentary rocks ranging from conglomerate to claystone and coal. Generally east-dipping along the Bear Creek Valley but broadly folded in the Sams Valley and Table Rocks area (Wiley and Hladky, 1991). Fine-grained facies are prone to landslides. Divided to show:

Tepv — **Volcaniclastic sandstone member (upper Eocene)**
Volcaniclastic sandstone, pebbly sandstone, and shale that make up the upper part of the Payne Cliffs east of Ashland. These rocks are the earliest indication of volcanic activity in the Western Cascade Range in the area. *(Geodatabase unit Tepv)*

Tep — **Arkosic sandstone and siltstone (middle and upper Eocene)**
Arkosic nonmarine sandstone, siltstone, pebbly sandstone, shale, and claystone. *(Geodatabase unit Tep)*

Tepc — **Basal conglomerate member (middle Eocene)**
Conglomerate, pebbly sandstone, and sandstone that mark the base of the Payne Cliffs Formation (Wiley and others, 1998). The basal conglomerate overlies the marine Hornbrook Formation with slight angular unconformity; and upper Cretaceous, Paleocene, and lower Eocene strata are missing along the unconformity. *(Geodatabase unit Tepc)*

Unconformity

CRETACEOUS MARINE SEDIMENTARY ROCKS

Hornbrook Formation (mid- to Late Cretaceous)
Siliciclastic, locally fossiliferous sedimentary rocks deposited in varied environments ranging from very shallow (nonmarine?) nearshore to deep (below wave base) marine submarine fans. These rocks lap across Jurassic tectonostratigraphic terranes in southern Oregon and northern California and so provide a minimum age for amalgamation. To show fining-upward sequences that are associated with repeated marine transgressions this unit has been divided into:

Khf — **Fine-grained facies (mid- to Late Cretaceous)**
Marine siltstone and mudstone deposited on deep submarine fans, includes some thin-bedded turbidites. *(Geodatabase units Kbg, Kdc, Kmm, Kdh)*

Khm — **Hornbrook Formation, sandstone (mid- to Late Cretaceous)**
Siliciclastic sandstone with minor siltstone, pebbly sandstone, and conglomerate. Deposited in shallow to deep submarine fan environments. *(Geodatabase units Krg, Kog, Kbhs, Kpr, Ka)*

Khsc — **Hornbrook Formation, sandstone and conglomerate (mid- to Late Cretaceous)**
Micaceous and arkosic pebbly sandstone, conglomerate, sandstone, and siltstone. Sedimentary structures indicate that these rocks formed in both shallow and deep marine (submarine fan) environments. *(Geodatabase units Kjv, Kbhc)*

Angular Unconformity

JURASSIC AND TRIASSIC TECTONOSTRATIGRAPHIC TERRANES

Applegate Terrane (Jurassic and Triassic)
Complexly deformed broken formation consisting of variably metamorphosed marine volcaniclastic and quartzose sedimentary rock (Wiley, 2006a), mafic to intermediate volcanic rock, and ultramafic rock and serpentinite. Thick sequences of interlayered metavolcaniclastic and metasiliciclastic rocks suggest that both volcanic (arc?) and continental sources contributed sediment to this terrane. Over several kilometers these rocks appear to be broadly warped into domelike and basinlike structures. Amphibolite-grade metamorphic rock is more common near structural highs or plutons, whereas greenschist-facies rocks are preserved in structural lows (Wiley, 2006b). The chemistry of the metavolcanic rocks and presence of ultramafic rocks suggest that this terrane originated in a back-arc or ocean margin setting. Divided to show:

JTrs — **Metasedimentary rock (Jurassic and Triassic)**
Predominantly volcaniclastic metasandstone, argillite, and metaconglomerate, with small lenses of limestone and marble. The protolith was probably a sedimentary apron derived from a nearby volcanic arc. *(Geodatabase units JTrs, JTrsa, JTram, JTrl)*

JTrq — **Quartzose metasedimentary rock (Jurassic and Triassic)**
Quartzite and laminated to massive quartzose meta-siltstone beds alternating with siliceous slate and phyllite. Locally includes quartzbiotite schist and metachert. *(Geodatabase unit JTrq)*

JTrv — **Metavolcanic rock (Jurassic and Triassic)**
Meta-andesite and metabasaltic andesite derived from volcanic rocks erupted in or near the marine environment. Distinguished from volcaniclastic sedimentary rocks by the presence of vesicles or amygdules and associated deep- to bright red or maroon soils. *(Geodatabase units JTra, JTraa, JTrdt, JTrv)*

u — **Ultramafic rock (Jurassic and Triassic)**
Serpentinite and serpentized pyroxenite, harzburgite, and dunite. The serpentinite is typically associated with fault zones, and the serpentinized ultramafic rocks are interpreted as fault-bounded blocks of oceanic or transitional crust. Commonly associated with bright red soils of poor quality and resultant patches and fields of stunted vegetation. *(Geodatabase units sp, u)*

INTRUSIVE ROCKS

Ti — **Tertiary intrusive rocks (Eocene to Miocene)**
Mafic to intermediate dikes and sills occur throughout the valley with a distinctive suite of felsic dikes present from Emigrant Lake south. Most dikes south of Emigrant Lake parallel the northwest trend of nearby faults. Where fresh and appropriately jointed, this unit is an aggregate source for crushed rock. *(Geodatabase units Ti, Tmib, Tmdi, Tii, Tid, Tif, Tih, Tim)*

JKi — **Mesozoic intrusive rocks (Late Jurassic to Early Cretaceous)**
Granitic intrusions ranging in composition from granite to diorite and quartz diorite. There are three main intrusions: the 148 Ma Gold Hill pluton, the 154 Ma Jacksonville pluton, and the 161 Ma Ashland batholith (zircon ages reported by Irwin and Wooden, 1999). Locally, this unit includes small dikes of more wide ranging composition including a distinctive suite of andesite dikes containing abundant acicular hornblende. Permeability is widely variable in the plutons and batholith. High permeability is generally associated with the base of deeply weathered rock but may occur in fresher rock along fracture zones. *(Geodatabase units KJi, Jghi, Jji, Jad, Jag, Jagd, Jam, Jaq, Jat)*

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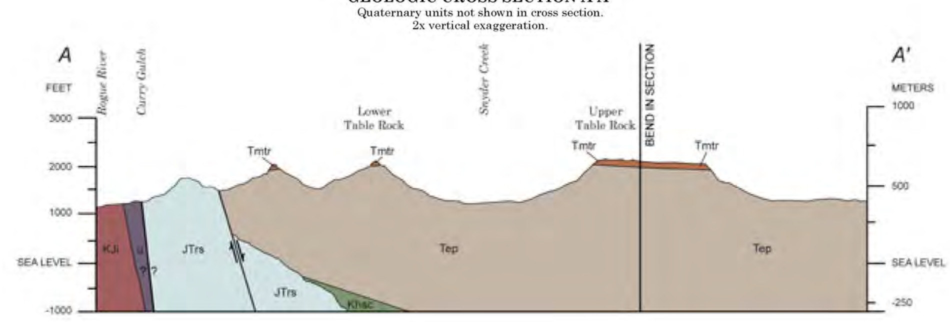
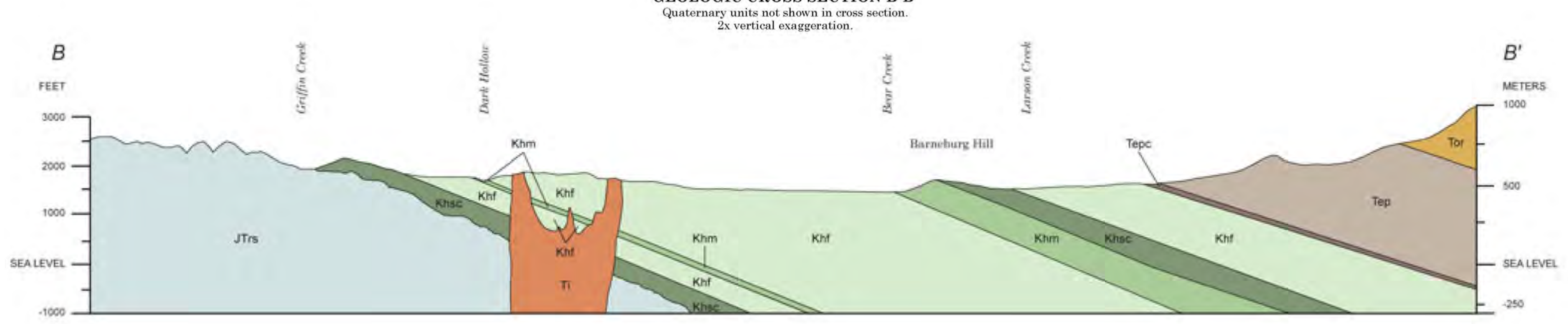
GEOLOGIC CROSS SECTION A-A'
Quaternary units not shown in cross section.
2x vertical exaggeration.

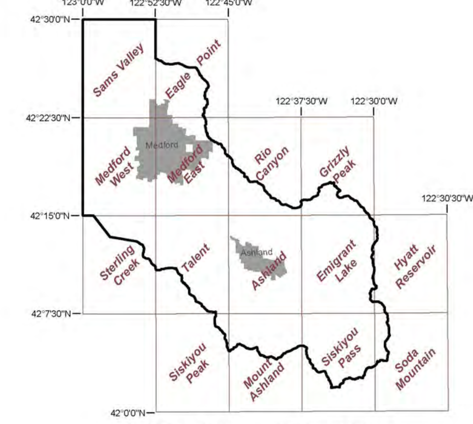


GEOLOGIC CROSS SECTION B-B'
Quaternary units not shown in cross section.
2x vertical exaggeration.

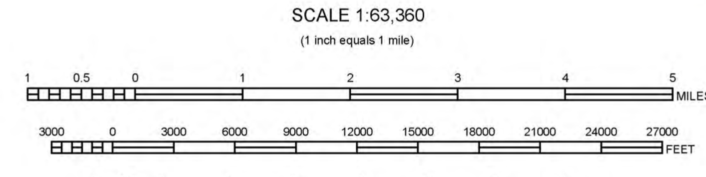


EXPLANATION OF MAP SYMBOLS

- USGS 7.5' Quadrangle Corner
- Study Area Boundary
- Cross Section
- Interstate
- State Route
- Local Road
- Urban Growth Boundary
- Water Course
- Open Water
- 28 Small, minor inclined joint, showing strike and dip
- Small, minor vertical or near-vertical joint, showing strike
- Horizontal bedding
- 28 Inclined bedding, showing strike and dip
- Vertical bedding, showing strike
- Gently inclined (between 0° and 30°) bedding, as determined remotely or from aerial photographs, showing approximate strike and direction of dip
- Moderately inclined (between 30° and 60°) bedding, as determined remotely or from aerial photographs, showing approximate strike and direction of dip
- Steeply inclined (between 60° and 90°) bedding, as determined remotely or from aerial photographs, showing approximate strike and direction of dip
- 28 Inclined generic foliation, showing strike and dip
- Vertical generic foliation, showing strike
- 28 Inclined flow banding, lamination, layering, or foliation in igneous rock
- Vertical flow banding, lamination, layering, or foliation in igneous rock, showing strike
- 28 Inclined generic lineation or linear structure, showing bearing and plunge
- 28 Inclined aligned-mineral lineation, showing bearing and plunge
- Fault - identity and existence certain, solid where accurate, long dash where approximate, dotted where concealed
- Normal fault - identity and existence certain, bar and ball on downthrown side, solid where accurate, long dash where approximate, dotted where concealed. Question mark indicates a questionable identity and existence
- Normal fault - identity and existence certain, bar and ball on downthrown side, location inferred
- Oblique-slip fault, right-lateral offset - identity and existence certain, bar and ball on downthrown side, arrows show relative motion, solid where accurate, dotted where concealed
- Lineament


USGS 7.5' Topographic Quad Index

SCALE 1:63,360
(1 inch equals 1 mile)



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Lidar sources: LDQ-2010 Rogue Valley Bundles 2, 3, 4, 5, and 6; and the Oregon Lidar Consortium (Eagle Point, 2011). The lidar was flown in 2002, 2006, 2007, 2009, and 2010. Please see the following web site for more information: http://www.oregongeology.org

The 10 m digital elevation model (DEM) was created by the U.S. Geological Survey and published in 1997.

Urban growth boundaries were published by the Oregon Department of Land Conservation and Development in 2010.

Transportation data were created by Tele Atlas North America, Inc. and published by Esri in 2008.

Water courses were published by the Pacific Northwest Hydrography Framework in 2005.

Software used: ArcGIS 10.0 and Adobe Acrobat 9.0
Data Projection: Lambert Conformal Conic
Datum: NAD83 HARN Unit: international feet

Geology by Thomas J. Wiley and Jason D. McClaughry, Oregon Department of Geology and Mineral Industries, Portland and Baker City, Oregon; and Jad A. D'Allura, Chemistry, Physics, Materials Science, and Engineering Department, Southern Oregon University, Ashland, Oregon.

Geologic field work was conducted in April 2011.

Cartography by Rachel Lyles
Publication reviewed by Deb Schueller
Oregon Department of Geology and Mineral Industries